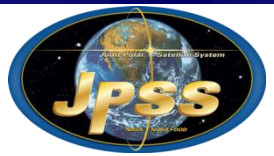


Ozone Mapping and Profiler Suite (OMPS)

Overview

Dr. Sarah Lipscy

Ball Aerospace and Technologies Corp.

OMPS Instrument Scientist &

OMPS Deputy Program Manager

August 26, 2015

Ozone Mapping and Profiler Suite (OMPS)

S-NPP OMPS

Nadir Sensor:
Nadir Mapper (NM) Spectrometer
&
Nadir Profile (NP) Spectrometer

Limb Profile (LP) Spectrometer

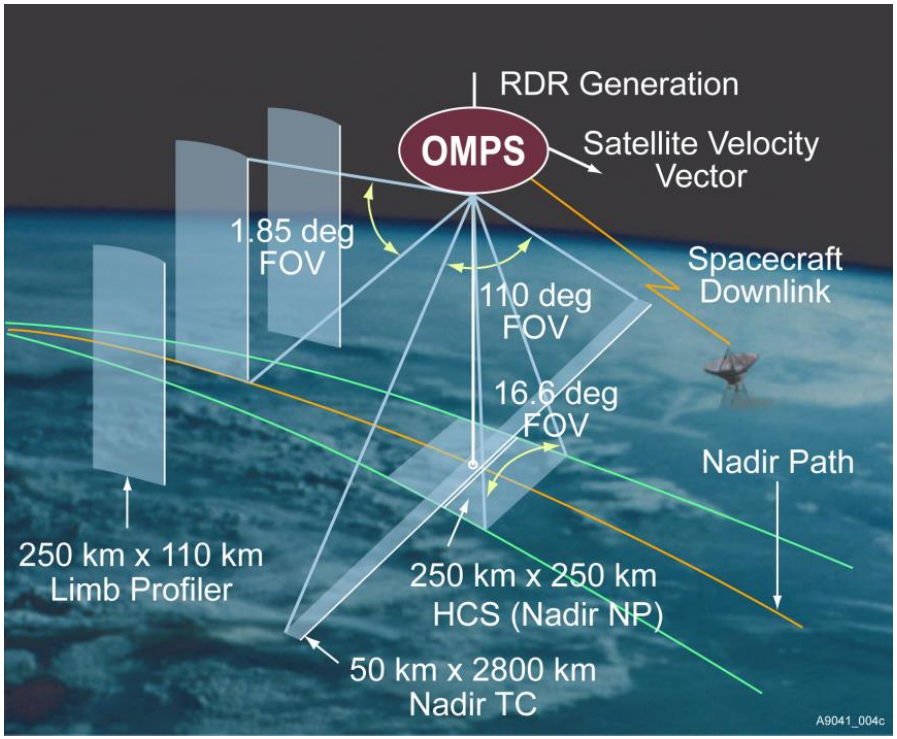
Main Electronics Box (MEB)

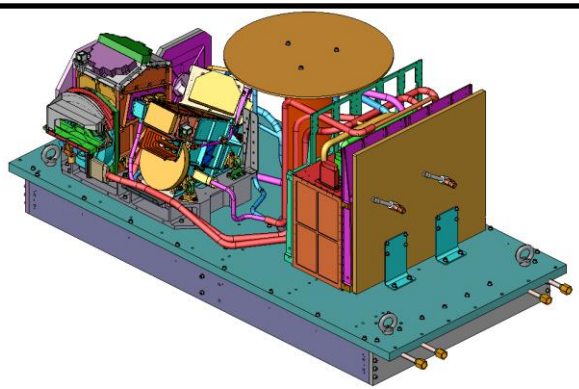
S-NPP Spacecraft

Satellite Velocity Vector

OMPS Configurations and Views

- **OMPS sensors - nadir and limb - use the same electronics box**
- **Nadir spectrometer footprints overlap**

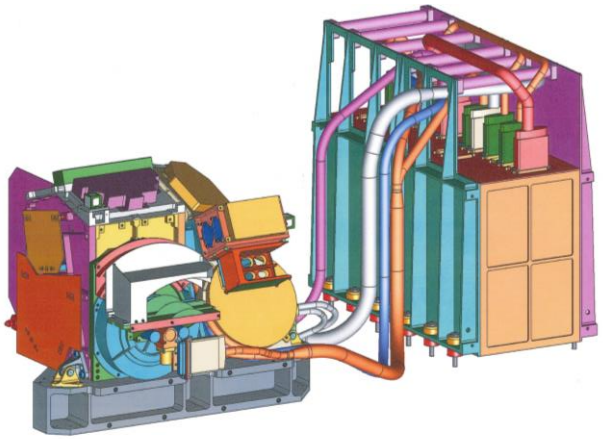




S-NPP OMPS: Nadir and Limb sensors

– **Launched October 2011**

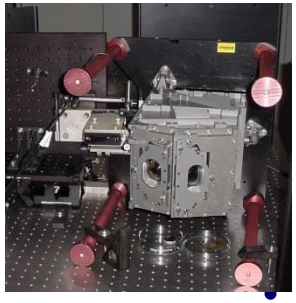
JPSS-2 OMPS: Nadir and Limb sensors



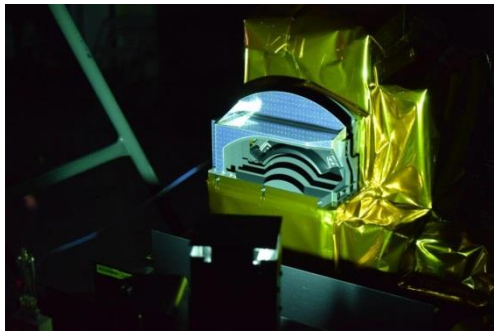
JPSS-1 OMPS: Nadir sensor only

Ball Aerospace's Role in OMPS

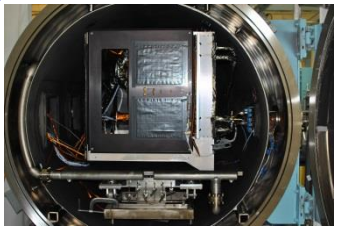
- **Spectrometers:**
  - Design
  - Integrate & Align
  - Characterize & Calibrate
  - Environmental Test
  - Modeling
  - Day 1 Calibration Tables (SCDBs)



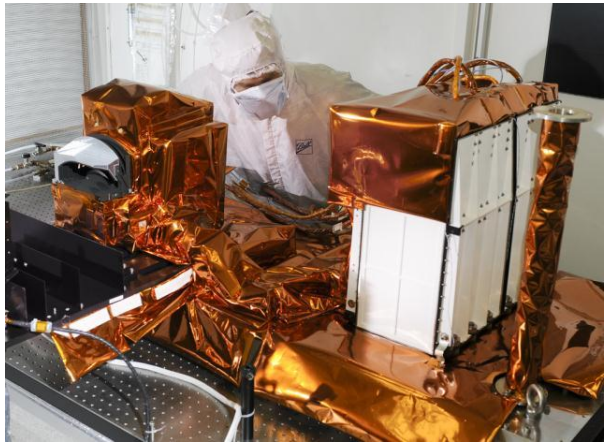
- **Focal Plane Assemblies:**
  - Procure Chip-on-Carriers
  - Design and build FPA
  - Environmental Test
  - Modeling
- **Electronics:**
  - Design
  - Integrate & Test
  - Environmental Test
  - Modeling



- **Integrated Sensor Suite**
  - Integrate
  - Environmental Test
  - Modeling
  - Day 1 CONOPS Tables

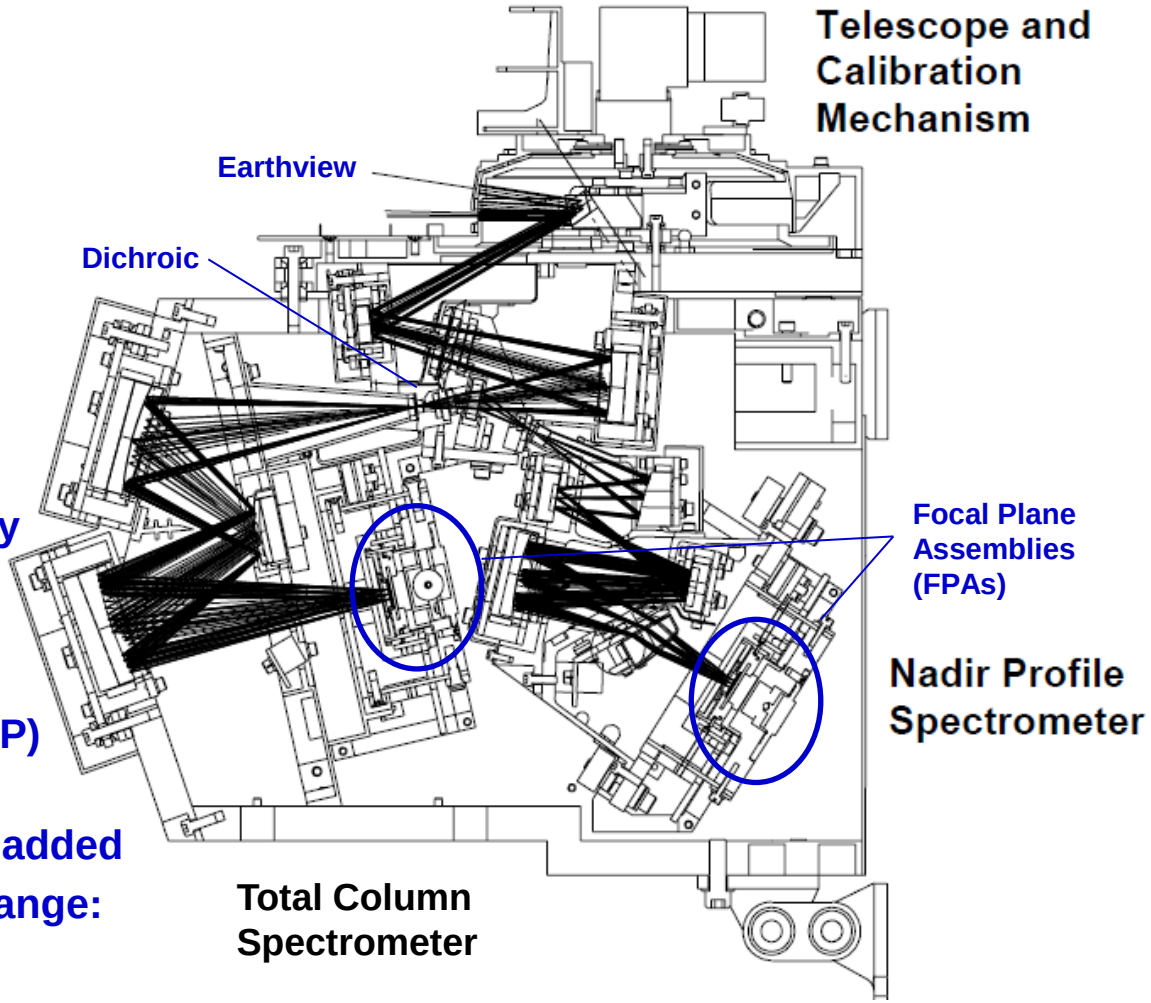


- **Post-Delivery Support**
  - Pre-Launch Support
  - Post-Launch Support

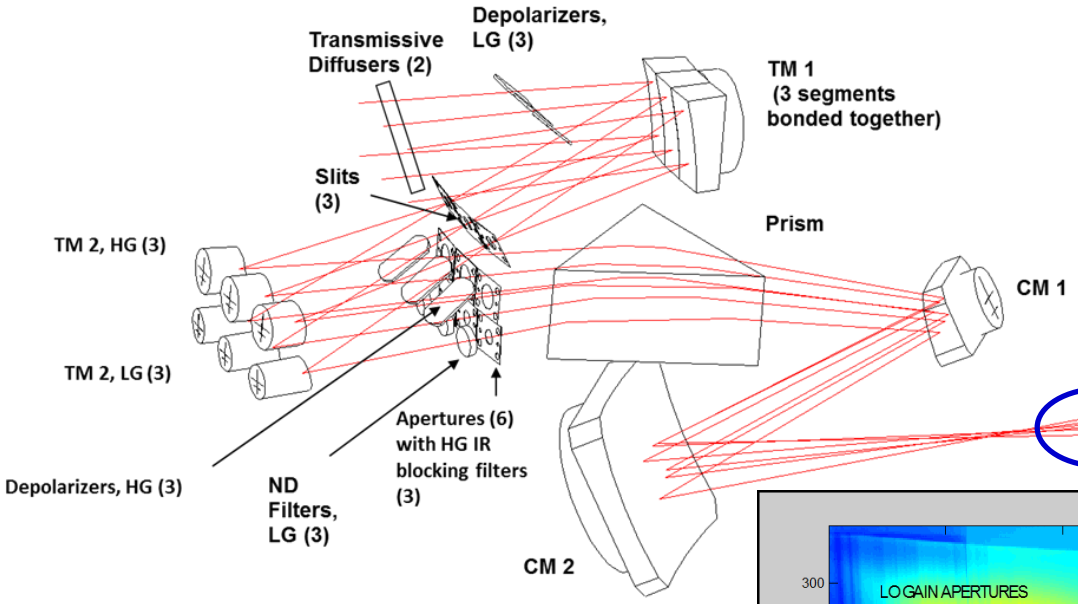


OMPS Sensors: Nadir Mapper and Profiler

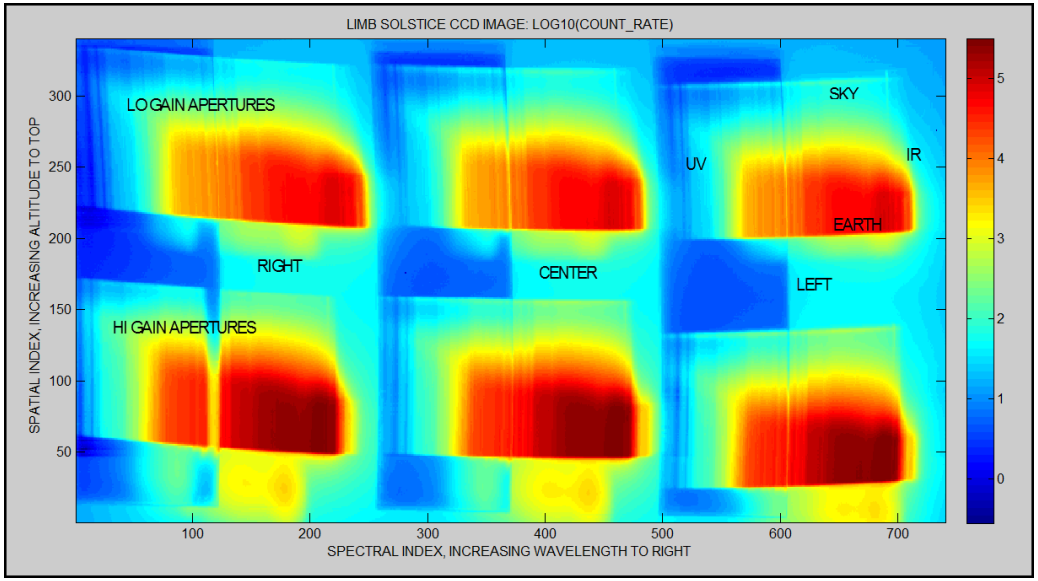
- Nadir Profiler (250 - 310 nm)
- Nadir Mapper (300 - 380 nm)
- Shared telescope; separate spectrometers and FPAs
- Shutter-less
- Changes S-NPP OMPS to J1 OMPS:
  - Diffuser: Al to QVD; ~67% reduction in irradiance and albedo calibration uncertainty due to decreased fine structure effects
  - Data Rate: Maximum rate increased from 196 kbps (NPP) to 409.6 kbps (J1)
  - Data compression capability added
  - NM Calibrated Wavelength Range: 380 nm to 417 nm (~420 nm)



OMPS Sensors: Limb Profiler



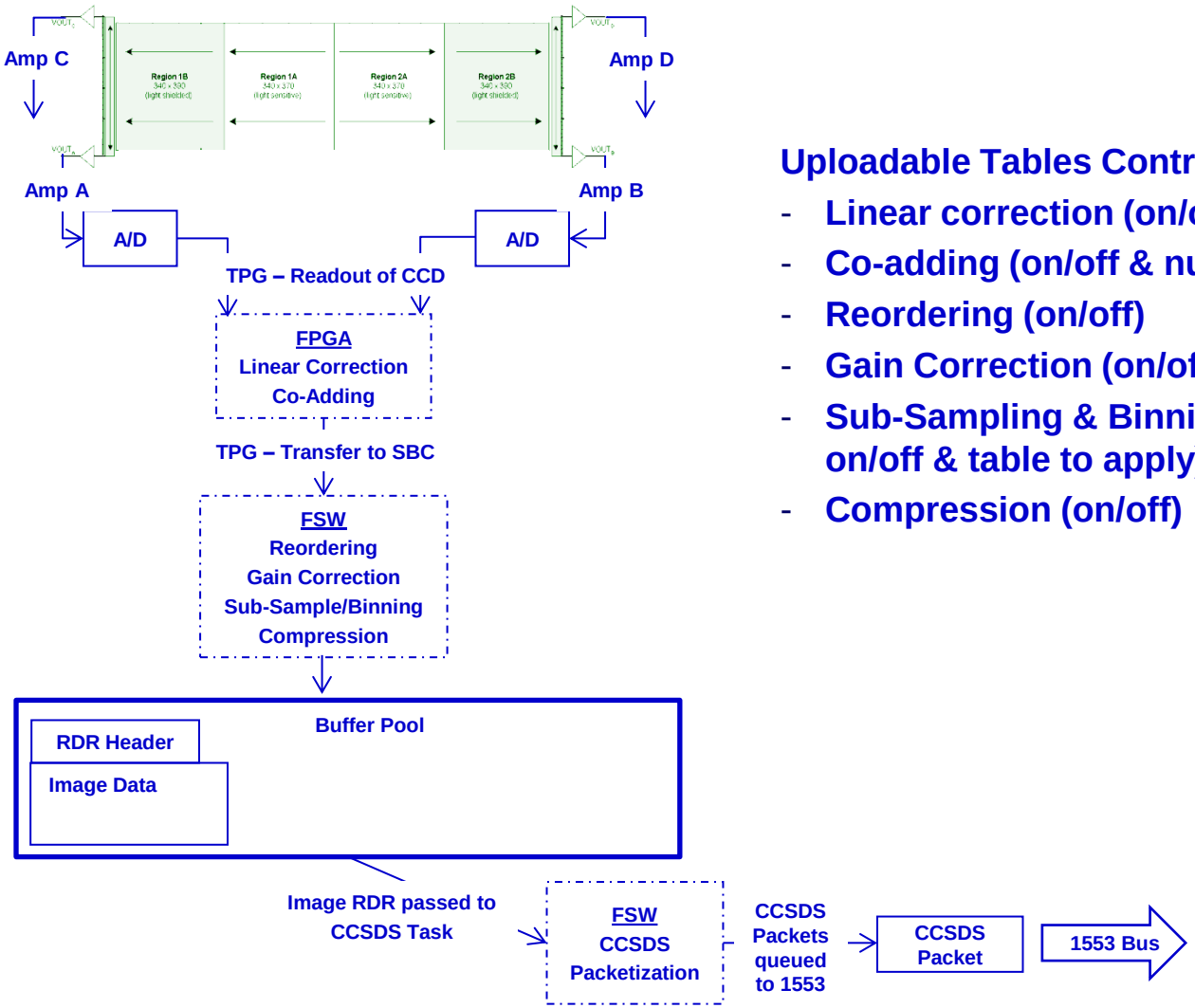
- Limb Profiler (290-1000nm)
- Single Focal Plane Assembly (FPA)
- Shutter-less
- No Limb Profiler on JPSS-1



OMPS Focal Planes

- Operated at -45C (NP and LP) or -30C (NM)
- Custom split frame transfer CCDs operated in backside illuminated configuration. Two halves read out separately.
  - Binning can occur only along readout
- Equipped with anti-blooming drains

OMPS Image Data Flow



Uploadable Tables Control:

- Linear correction (on/off & table to apply)
- Co-adding (on/off & number)
- Reordering (on/off)
- Gain Correction (on/off & table to apply)
- Sub-Sampling & Binning (a.k.a. Sample Table; on/off & table to apply)
- Compression (on/off)

OMPS Flexibility

- **With the uploadable tables, OMPS is very flexible**
  - **TPGs: Integration times, Coadds, Binning, Sub-sampling, and Linearity Correction Tables**

BATC-delivered Image Data Products	Along-Track Resolution	Cross-Track Resolution	Spectral Pixels
NM – NPP Earthview	Image every 7.5 seconds – (6 co-added frames of 1.25 seconds)	Each macro-pixel is binned from 20 individual pixels	196 wavelength pixels
NM – J1 "Hi-Res" Earthview	Image every 1.25 seconds - (No co-adding)	Each macro-pixel is binned from 5 individual pixels	210 wavelength pixels
NP – NPP Earthview	Image every 37.4 seconds – (3 co-added frames of 12.5 seconds)	All spatial pixels binned into a single "spatial" column	148 wavelength pixels
NP – J1 "Hi-Res" Earthview	Image every 7.5 seconds – (No co-adding)	Spatial pixels binned into 5 different "spatial" columns	148 wavelength pixels

With increased data rate allocation and available on-board data compression for OMPS J1, we have increased along-track resolution of Nadir Mapper Earthview image product by ~6x, and the cross track by ~4x – in addition to sending ~420 nm wavelength pixels.

  - **Stored Command Sequences (CBM): allow modification to on-orbit timing**
    - » **i.e. begin/end of Earthview imaging or calibration or change to activities on dark-side**

OMPS Status

- **S-NPP OMPS: Performing on-orbit**
- **JPSS-1 OMPS: January 2015 successful integration to spacecraft**
- **JPSS-2 OMPS: Delivery Planned August 2018**